

Physics	Group-II	Page
Time: 15 Minutes	(Objective Type)	Marks

Note: Four possible answers A, B, C and D to each question are given. The choice which you think is correct, fill that circle in front of that question with Marker or Pen ink in the answer-book. Cutting or filling two or more circles will result in zero marks for that question.

- 1-1- ☒ The rate of change of momentum is called:
 - (a) Force ✓
 - (b) Mass
 - (c) Time
 - (d) Torque
- 2- The unit of Gravitational Constant G is:
 - (a) $\text{Nm}^{-2} \text{kg}^{-2}$
 - (b) Nm kg^{-1}
 - (c) kg
 - (d) $\text{Nm}^2 \text{kg}^{-2}$ ✓
- 3- A force of 10 N is making an angle of 30° with the horizontal. Its horizontal component will be:
 - (a) 4 N
 - (b) 5 N
 - (c) 7 N
 - (d) 8.7 N ✓
- 4- The value of 'g' at the surface of moon is:
 - (a) 1.06 ms^{-2}
 - (b) 1.62 ms^{-2} ✓
 - (c) 1.6 ms^{-1}
 - (d) 0.16 ms^{-2}
- 5- See-saw is an example of:
 - (a) Circular motion
 - (b) Rotatory motion
 - (c) Vibratory motion ✓
 - (d) Random motion
- 6- Rate of doing work is called:
 - (a) Energy
 - (b) Torque
 - (c) Power ✓
 - (d) Momentum
- 7- An interval of $200 \mu\text{s}$ is equivalent to:
 - (a) 0.2 S
 - (b) 0.02 S
 - (c) $2 \times 10^{-4} \text{ s}$ ✓
 - (d) $2 \times 10^{-6} \text{ s}$

The unit of rate of conduction of thermal energy is:

- (a) J s^{-1} ✓ (b) J
(c) K (d) J K^{-1}

A measuring cylinder is used to measure:

- (a) Mass (b) Area
(c) Volume ✓ (d) Level of a liquid

0- False ceiling is done to:

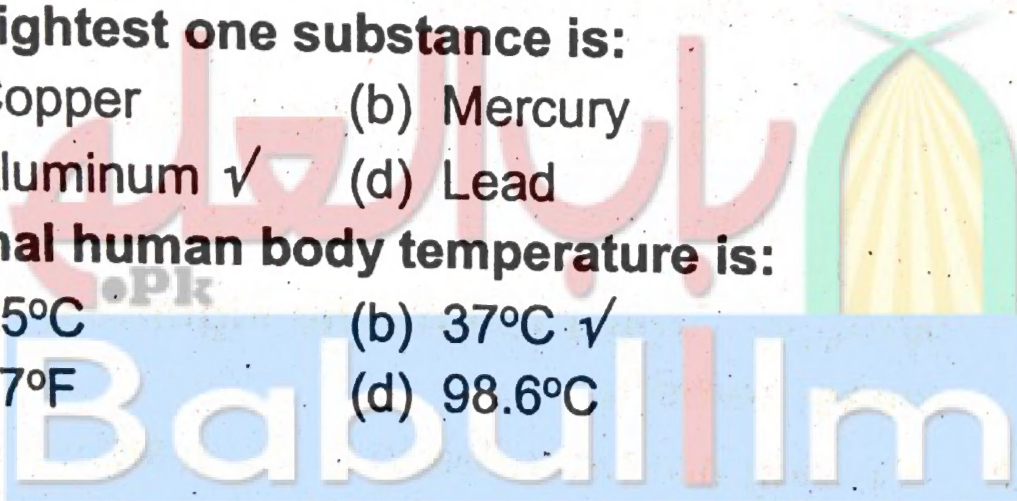
- (a) Lower the height of ceiling
(b) Keep the roof clean
(c) Cool the room
(d) Insulate the ceiling ✓

11- The lightest one substance is:

- (a) Copper (b) Mercury
(c) Aluminum ✓ (d) Lead

12- Normal human body temperature is:

- (a) 15°C (b) 37°C ✓
(c) 37°F (d) 98.6°C



Physics	Group-II	Paper
Time: 1.45 Hours	(Subjective Type)	Marks: 40

(Part-I)

2. Write short answers to any Five (5) question: 10

(i) Define base and derived quantities.

Ans Base quantities are the quantities on the basis of which other quantities are expressed.

The quantities that are expressed in terms of base quantities are called derived quantities.

(ii) What is meant by prefixes? Write an example also.

Ans Prefixes are the words or letters added before units such as kilo, mega, giga and milli. For example, divide 20,000 g by 1,000 to express it into kg.

$$20,000 \text{ g} = \frac{20,000}{1,000} \text{ kg} = 20 \text{ kg}$$

(iii) Write two rules to find the significant digits in a measurement.

Ans Following are two rules to find the significant digits in a measurement:

1. Non-zero digits are always significant.
2. Zeros between two significant figures are also significant.

(iv) Define distance and displacement.

Ans Length of a path between two points is called the distance between those points.

Displacement is the shortest distance between two points which has magnitude and direction.

(v) Define uniform speed.

Ans A body has uniform speed if it covers equal distances in equal intervals of time however short the interval may be.

(vi) Define gravitational acceleration.

Ans The acceleration of freely falling bodies is called gravitational acceleration. It is denoted by g and its value is 10 ms^{-2} .

(vii) Define force and write the name of its unit.

Ans A force moves or tends to move, stops or tends to stop the motion of a body. The unit of force is the Newton and denoted by symbol N .

(viii) Define inertia.

Ans "Inertia of a body is its property due to which it resists any change in its state of rest or motion."

3. Write short answers to any Five (5) questions: 10

(i) Define centre of gravity.

Ans A point where the whole weight of the body appears to act vertically downward is called centre of gravity of a body.

(ii) When a body is said to be in equilibrium?

Ans A body is said to be in equilibrium if no net force acts on it.

(iii) ☒ Think of a body which is at rest but not in equilibrium.

Ans A ball thrown upward becomes at rest at the very top. At this state, it is not in equilibrium but it is at rest.

(iv) What is meant by the force of gravitation?

Ans Newton concluded that there exists a force due to which everybody of the universe attracts every other body. He named this force the force of gravitation.

(v) ☒ Why does the value of ' g ' vary from place to place?

Ans A value of ' g ' varies from place to place. The reason is that the value of ' g ' is inversely proportional to the

square of the radius of the Earth. It does not remain constant. It decreases with altitude. Altitude is the height of an object or place above sea level. The value of 'g' is greater at sea level than at the hills.

(vi) ✓ On what factors, the orbital speed of a satellite depends?

Ans The greater is radius of orbit, the smaller is orbital speed of satellite.

(vii) What is meant by the term "Power"?

Ans Rate of doing work is called power.

$$P = \frac{W}{t}$$

(viii) ✓ Name a device that converts mechanical energy into electrical energy.

Ans Generators, dynamo, etc. convert mechanical energy into electrical energy.

4. Write short answers to any Five (5) questions:

(i) Define pressure and write its SI unit.

Ans The force acting normally per unit area on the surface of a body is called pressure.

Pressure is a scalar quantity. In SI units, the unit of pressure is Nm^{-2} also called pascal (Pa). Thus

$$1 \text{ Nm}^{-2} = 1 \text{ Pa}$$

(ii) Define elasticity.

Ans The property of the solids because of which they restore their original shape when external force ceases to act.

(iii) Define heat and temperature.

Ans Temperature of a body is the degree of hotness or coldness of the body.

Heat is the energy that is transferred from one body to the other in thermal contact with each other as a result of the difference of temperature between them.

(iv) **Define Archimedes Principle.**

Ans Archimedes principle states that:

"When an object is totally or partially immersed in a liquid, an upthrust acts on it equal to the weight of the liquid it displaces."

(v) **Define thermal expansion.**

Ans Most of the substances solids, liquids and gases expand on heating. Thermal expansion results an increase in length, breadth and thickness of a substance.

(vi) **How does heat reach us from the sun?**

Ans It is through radiation that heat reaches us from the Sun. Radiation is the mode of transfer of heat from one place to another in the form of waves called electromagnetic waves.

(vii) **Write any two measures you suggest to conserve energy in houses.**

Ans Following two measures are suggested to conserve energy in houses:

1. Bulbs can be replaced by energy savers for light.
2. We can use such electric appliances that consume less energy.

(viii) **Define convection.**

Ans Transfer of heat by actual movement of molecules from hot place to a cold place is known as convection.

(Part-II)

Note: Attempt any Two (2) questions.

Q.5.(a) Prove first equation of motion with the help of speed-time graph. (4)

Ans Speed-time graph for the motion of a body is shown in the following figure. Slope of line AB gives the acceleration a of a body.

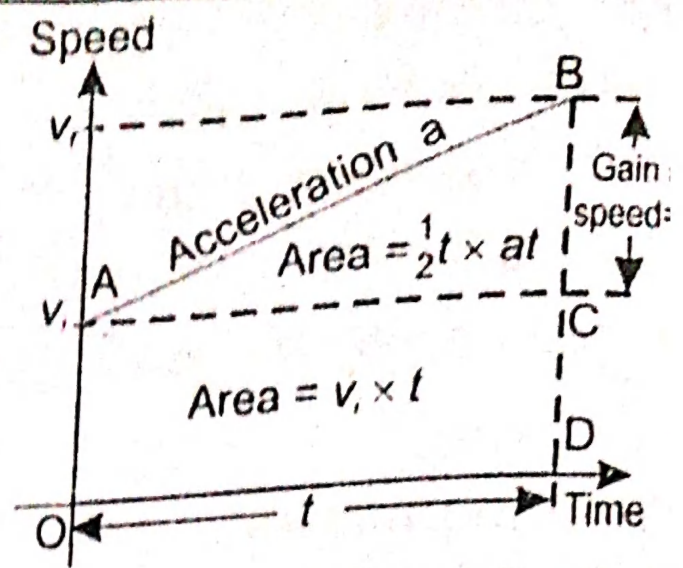


Fig. Speed-time graph. Area under the line represents the distance covered by the body.

$$\text{Slope of line AB} = a = \frac{BC}{AC} = \frac{v_f - v_i}{t}$$

as $BD = v_f$, $CD = v_i$ and $OD = t$

Hence $a = \frac{v_f - v_i}{t}$

or $v_f - v_i = at$

$\therefore v_f = v_i + at$

(b) How much is the force of friction between a wooden block of mass 5 kg and a marble floor? The coefficient of friction between wood and the marble is 0.6.

Ans

$m = 5 \text{ kg}, \quad \mu = 0.6$

$F = ?$

But

$F_n = mg$

$F_n = 5 \times 10$

$F \propto F_n$

$= 50 \text{ N}$

$F = \mu F_n$

$F = 0.6 \times 50$

$F = 30 \text{ N}$

If a force is formed from two mutually perpendicular components then such components are called its perpendicular components.

Resolve the force into Perpendicular Components:

Consider a force F represented by line OA making an angle θ with x -axis as shown in the following figure.

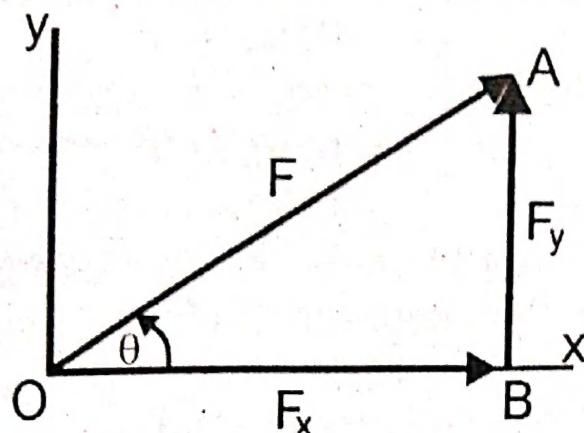


Fig. Resolution of a force.

Draw a perpendicular AB on x -axis from A . According to head-to-tail rule, OA is the resultant of vectors represented by OB and BA .

$$\text{Thus } OA = OB + BA \quad (I)$$

The components OB and BA are perpendicular to each other. They are called the perpendicular components of OA representing force F . Hence OB represents its x -component F_x and BA represents its y -component F_y . Therefore, equation (I) can be expressed as

$$F = F_x + F_y \quad (II)$$

The magnitudes F_x and F_y of forces F_x and F_y can be found using the trigonometric ratios. In right angled triangle OBA

$$\text{Since } \frac{F_x}{F} = \frac{OB}{OA} = \cos \theta$$

$$F_x = F \cos \theta \quad (III)$$

$$\text{Similarly, } \frac{F_y}{F} = \frac{BA}{OA} = \sin \theta$$

$$\therefore F_y = F \sin \theta \quad (IV)$$

Equation (III) and (IV) give the perpendicular components F_x and F_y , respectively.

- (b) A girl carries a 10 kg bag upstairs to a height of 18 steps, each 20 cm high. Calculate the amount of work, she has done to carry the bag. (Where $g = 10 \text{ ms}^{-2}$)

Ans Mass of the bag $m = 10 \text{ kg}$
Weight of the bag $w = mg$
 $= 10 \text{ kg} \times 10$
 $= 100 \text{ N}$

To carry the bag upstairs, the girl exerts an upward force F equal to w , the weight of the bag. Thus

$$F = 100$$

$$\text{Height of one step} = 20 \text{ cm} = 0.2 \text{ m}$$

$$\text{Height of 18 steps} = 18 \times 0.2 = 3.6 \text{ m}$$

$$W = Fh$$

$$= 100 \times 3.6 = 360 \text{ J}$$

The girl has done 360 J of work.

Q.7.(a) Explain three scales of temperature.

(4)

Ans Scales of Temperature:

A scale is marked on the thermometer. The temperature of the body in contact with the thermometer can be read on that scale. Three scales of temperature are in common use. These are:



Fig. Various scales of temperature.

- (i) Celsius scale or Centigrade scale
- (ii) Fahrenheit scale
- (iii) Kelvin scale

(i) Celsius scale:

On Celsius scale, the interval between lower and upper fixed points is divided into 100 equal parts as shown in figure. The lower fixed point is marked as 0°C and the upper fixed point is marked as 100°C .

(ii) Fahrenheit scale:

On Fahrenheit scale, the interval between lower and upper fixed points is divided into 180 equal parts. Its lower fixed point is marked as 32°F and upper fixed point is marked as 212°F .

(iii) Kelvin scale:

In SI units, the unit of temperature is kelvin (K) and its scale is called Kelvin scale of temperature as shown in figure. The interval between the lower and upper fixed points is divided into 100 equal parts. Thus, a change in 1°C is equal to a change of 1 K. The lower fixed point on this scale corresponds to 273K and the upper fixed point is referred as 373 K. The zero on this scale is called the absolute zero and is equal to -273°C .

(b) Calculate the volume of a gold bar of mass 0.2 kg. The density of gold is 19300 kg m^{-3} . (5)

Ans Density of gold = 19300 kg m^{-3}

mass = 0.2 kg

Volume = ?

$$D = \frac{m}{v}$$

$$V = \frac{m}{D}$$

$$= \frac{0.2}{19300}$$

$$= 1.04 \times 10^{-5} \text{ m}^3$$